OCEAN ENGINEERING DIVISION

UNITED STATES COAST GUARD

WASHINGTON, D.C.

OCTOBER 2005

SPECIFICATION FOR FABRICATION OF BUOY SOLAR BATTERY BOXES

SPECIFICATION NO. 460

REVISION H

1. SCOPE

1.1 Scope. This specification defines the requirements for the fabrication of buoy solar battery boxes for use on aids to navigation buoys.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are referenced in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification which are recommended for additional information or used as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements cited in sections 3 and 4 of this specification, whether or not the referenced documents are listed here.

2.2 Government Documents. The following documents form a part of this specification to the extent referenced herein. Suffixes denoting the specific issue of each document are omitted from future references to the documents in this specification.

SPECIFICATIONS

MIL-PRF-24647D 16 FEB 2005	Paint System, Anticorrosive and Antifouling, Ship Hull
QPL-24647-7 28 SEP 2004	Qualified Products List of Products Qualified Under Military Specification MIL-P-24647, Paint System, Anticorrosive and Antifouling, Ship Hull
MIL-R-900F(1) 27 MAR 91	Rubber Gasket Material, 45 Durometer Hardness
MIL-PRF-24176C 14 OCT 2004	Military Specification, Cement, Epoxy, Metal Repair and Hull Smoothing
MIL-S-19622/1B 11 OCT 2002	Stuffing Tube, Straight Nylon Military Specification Sheet
MIL-S-19622/19D 17 OCT 2002	Stuffing Tube, Nylon, Sizes 4 and 4T: Packing Assembly for; Military Specification Sheet

2.3 Industry Publications. The following documents of the issues specified form a part of this specification to the extent referenced herein. Suffixes denoting the specific issue of each document will be omitted from future references to the document in this specification.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A36-01	Standard Specification for Carbon Structural Steel
A276-00ae1	Standard Specification for Stainless Steel Bars and Shapes
A314-97	Standard Specification for Stainless Steel Billets and Bars for Forging

A351-00	Standard Specification for Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts
D4066-01	Standard Classification System for Nylon Injection and Extrusion Materials (PA)

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1-2004	Structural Welding Code - Steel

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC-SP-10/ NACE No. 2 2000	Near White Blast Cleaning

AMERICAN SOCIETY FOR QUALITY CONTROL (ASQC)

ANSI/ASQC Q9001-2000	Quality Management Systems - Requirements

2.4 Drawings. The latest revision of the following United States Coast Guard Ocean Engineering drawings form a part of this specification to the extent referenced herein, and shall be referred to as "the drawings" throughout this specification:

Drawing Number	Title
121100	Buoy Solar Double Battery Box
121102	Swingbolt and Clevis Pin

2.5 Source of Documents. The documents may be obtained from the following sources:

Government Documents.

Standardization Documents Order Desk
Building 4, Section D
700 Robbins Avenue
Philadelphia, PA 19111-5094

Industry Publications.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
1916 Race Street
Philadelphia, PA 19103-1187

AMERICAN WELDING SOCIETY (AWS)
550 NW LeJeune Road
PO Box 351040
Miami, Florida 33135

STEEL STRUCTURES PAINTING COUNCIL (SSPC)
4400 Fifth Avenue
Pittsburgh, PA 15213

AMERICAN SOCIETY FOR QUALITY CONTROL (ASQC)
310 West Wisconsin Avenue
Milwaukee, Wisconsin 53203

2.6 Precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First Article Inspection. When specified (paragraph 6.1), buoy solar battery boxes shall be subjected to first article inspection in accordance with paragraph 4.3.

3.2 Materials.

3.2.1 Steel.

3.2.1.1 Steel Bars, Shapes, and Plates. All steel bars, shapes, and plates shall meet the requirements of ASTM A36, unless otherwise specified.

3.2.2 Stainless Steel.

3.2.2.1 Stainless Steel Bars, Shapes, and Plates. All stainless steel bars, shapes, and plates shall meet the requirements of ASTM A276, type 316 or 316L.

3.2.2.2 Stainless Steel Pipe and Fittings. The vent pipe nipple, half coupling and 90° street elbow shall meet the requirements of ASTM A351, type 316 or 316L.

3.2.2.3 Hardware. Stainless steel hardware (nuts, bolts, pins, swing bolts, etc.) shall meet the requirements of ASTM A314, type 316 or 316L.

3.2.3 Gasket Material. Rubber gasket material shall meet the requirements of MIL-R-900F.

3.2.4 Nylon. All nylon sheet and strips shall meet the requirements ASTM D4066, Type 6/6.

3.3 Design and Construction.

3.3.1 Design, Dimensions, and Dimensional Tolerances. All items shall conform to the design, dimensions, and tolerances shown in the drawing.

3.3.2 Threads. The threads on all nuts and bolts shall be Unified Course Thread Series (UNC). The threads on all nipples and elbows shall be 3/4 inch American National Standard Taper Pipe Thread (NPT).

3.3.3 Box Shell. Exterior seams shall be welded and ground smooth. To minimize welding, the battery box shell may be fabricated from one piece of steel plate.

3.3.4 Hold Down Bar. The battery hold down bar shall be fabricated in accordance with the drawing. It shall be formed and painted prior to attachment of the bar cushion.

Any suitable neoprene adhesive may be used which will not fail under typical marine environmental conditions and temperatures between 0ºF and 110ºF.

3.3.5 Nylon Slide Strips. The nylon slide strips shall be attached to the battery tray and battery box with any suitable adhesive, which will not fail under typical marine environmental conditions and temperatures between 0ºF and 110ºF. The nylon slide strips attached to the battery box shall be installed after the box has been painted.

3.3.6 Stuffing Tube. The plastic stuffing tube shall be in accordance with MIL-S-M19622/1B, size 4T, (pin M19622/1-005). The rubber-packing gland shall be in accordance with MIL-S-M19622/19D, size 4T, (pin M19622/19-004).

3.4 Welding. The plates, bars, rods and other shapes forming the various components of the items shall be fitted and faired prior to being welded in place. All welds shall be performed as indicated on the drawing. Shielded Metal Arc Welding (SMAW), Flux-Cored Arc Welding (FCAW), Gas Metal Arc Welding (GMAW), or Submerged Arc Welding (SAW) shall be used to weld all steel parts. All welding procedures and weld quality shall meet the requirements of AWS D1.1. All welders employed for welding under this specification shall be qualified by the Contractor using procedures which meet the requirements of AWS D1.1.

3.5 Marking.

3.5.1 Identification Marking. For tracking purposes, each item shall be identified by an identification marking. The marking shall be stamped, engraved, or otherwise permanently affixed to each item. The marking shall consist of ½ inch tall block alphanumeric characters and be clearly visible after the items have been painted. The marking shall be of the form 02-XX. The first two digits are the last two digits of the calendar year built and the last two letters are the Contractor's designation, which will be furnished by the Contracting Officer after contract award.

3.5.2 Serial Number. For inspection purposes, the Contractor shall assign each item a unique serial number. The serial number shall be stamped, engraved, or otherwise permanently affixed to each item. The serial number shall consist of ½ inch tall block alphanumeric characters and be clearly visible after the items have been painted.

3.6 Surface Preparation. Prior to surface preparation, all stainless steel parts shall be protected (i.e. taped, masked, etc). All steel surfaces shall be blast cleaned to near-white metal in accordance with SSPC-SP-10. Prior to painting, all surfaces shall be free of contaminants such as oil, water, grease, dirt, blasting residue, weld spatter, slag, and flash rust.

3.6.1 Epoxy Repair Compound. After all surfaces have been blasted clean, any weld containing porosity shall be filled with an epoxy repair compound meeting the requirements of MIL-PRF-24176C. The epoxy repair compound shall only be used to fill porosity discontinuities that are within the allowable maximums stated in table 6.1 of AWS D1.1.

3.7 Painting. Prior to painting, all stainless steel parts (except for the swingbolt pads and rack retainer strips) shall be protected (i.e. taped, masked, etc). The items shall be painted with the coating system outlined below. All painting shall be performed after the items have been cleaned in accordance with paragraph 3.6. All welding, machining, cutting, drilling, forming, or any other operation which would damage the coating system shall be performed prior to painting. The Contractor shall follow the manufacturer's

instructions for correct application of the coating system. In addition, the Contractor shall be responsible for implementing appropriate worker safety procedures for the application of the coating system, and for ensuring that the procedures are strictly followed by the paint applicators.

3.7.1 Coating system. The coating system shall include an epoxy primer and a polyurethane topcoat paint as described below. The paints in the coating system are commercial products available from a variety of manufacturers. However, the paints shall be applied as a complete system; i.e., all of the paints used (primer and topcoat) shall be from the same manufacturer.

3.7.1.1 Epoxy primer. All steel surfaces shall be coated with an epoxy primer. The epoxy primer shall meet the requirements of MIL-PRF-24647, Type I, Class 1A, Grade A or B, Application 1 or 2, and shall be listed in QPL-24647. The colors required are haze gray and off-white or buff (manufacturers' standard colors are acceptable). Apply by spraying two coats, 5 mils minimum dry film thickness each, using contrasting colors for each coat (haze gray followed by off-white or buff). Sharp corners, edges, and other hard-to-coat areas shall be striped before each full coat is applied.

3.7.1.2 Polyurethane topcoat. All carbon steel surfaces shall be coated with a marine grade of acrylic aliphatic polyurethane. This paint shall meet the following requirements: 1) it shall be a commercial product from the same manufacturer that supplies the epoxy primer; 2) it shall have a Volatile Organic Compound (VOC) content of no more than 340 g/L (2.8 lb/gal), a lead content of less than 0.06% by weight, and a chromium content of less than 0.06% by weight; 3) the color shall be gray. Apply by spraying one coat, 3 mils minimum dry film thickness. Sharp corners, edges, and other hard-to-coat areas shall be striped before the full coat is applied.

3.8 Documentation.

3.8.1 Quality Assurance Inspection Form. The Contractor shall develop and provide a Quality Assurance Inspection Form (QAIF). The QAIF shall be used to document the inspections and tests performed on every item throughout its fabrication process. The form shall be typewritten on standard (i.e., 8½x11 inch) white paper. Inspection results may be handwritten on the form. The form shall be prepared in the Contractor's format and shall be legible, in English, and suitable for reproduction. The form shall be made available to the Contracting Officer’s Technical Representative (COTR) for review.

3.8.1.1 QAIF Content. At a minimum the QAIF shall include:

a) Item serial number.
b) Date of test or inspection.
c) Test or inspection to be performed (list every test and inspection require by section 4.0).
d) Result of test or inspection.
e) Accept/Reject criteria for each test or inspection.
f) Corrective action taken (if any).
g) Notes.
h) Initials or signatures of Contractor’s test personnel.

3.8.2 Material Certifications. When requested by the COTR, the Contractor shall furnish material certifications, either from the material manufacturers or an independent testing laboratory, to the effect that all of the material described in paragraphs 3.2.1 through 3.2.4 and 3.7.1 have been tested and found to meet the requirements of the applicable

sections of this specification. The material certifications shall be stored by the Contractor for the life of the contract.

3.8.3 Material Inspection and Receiving Report (DD Form 250). A form DD-250 shall be used as a certification of product quality assurance, as a packing list, and as a certification of acceptance. The Contractor shall prepare a separate DD-250 for each shipping lot. Prior to shipment, the DD-250 must be signed by the COTR.

4. VERIFICATION

4.1 General. The Contractor's quality assurance program shall meet the requirements of ANSI/ASQC Q9001. However, the Contractor does not have to be Q9001 certified.

4.2 Classification of Inspections. The inspection requirements specified herein are classified as follows:

a. First article inspection (paragraph 4.3)
b. Contractor production inspection (paragraph 4.4)
c. Coast Guard production inspection (paragraph 4.5)

4.3. First Article Inspection. When first article samples are required (see paragraphs 3.1 and 6.1), the Contractor shall perform a first article inspection in accordance with paragraph 4.6.

4.3.1 First Article Tests and Inspections Notification. The Contractor shall notify the Contracting Officer in writing at least 7 calendar days prior to the scheduled commencement of any inspections and tests required by this specification.

4.3.2 Waiver of First Article Requirements. The Contracting Officer reserves the right to waive all or part of the first article requirements specified herein.

4.3.3 Rejection Criteria. The results of the first article inspection will be reviewed by the Contracting Officer to determine compliance with the requirements of this specification. Failure of any of the tests or inspections described herein will be cause for rejection of the first article. If the first article is rejected, the Contractor will be notified in writing by the Contracting Officer and allowed 14 calendar days to fix or resubmit a new first article. Repair or replacement of the first article shall be by the Contractor at the Contractor's expense.

4.3.4 Authorization to Proceed. Upon successful completion of the first article inspection, the Contracting Officer will provide the Contractor with written authorization to begin fabricating production quantities.

4.3.5 Standardization. Materials, parts, design, and fabrication methods used in the production quantities shall be identical to those used in the first articles, unless otherwise authorized in writing by the Contracting Officer.

4.4 Contractor Production Inspection. The tests and inspections required by this specification are not intended to supplant any controls, examinations, inspections, or tests normally employed by the Contractor to assure product quality. The Contractor shall perform the tests and inspections specified in paragraph 4.6 to ensure conformance to this specification. The Contractor shall provide space, personnel, and test equipment to conduct all inspection and test requirements.

4.5 Coast Guard Production Inspection. The Coast Guard reserves the right to observe, verify, or perform the tests and inspections outlined in paragraph 4.6.

4.6 Tests and Inspections. The following tests and inspections shall be conducted for each first article unit and subsequent production units:

a. Visual inspection
b. Weld inspection
c. Paint inspection
c. Documentation review

4.6.1 Visual Inspection. Each item shall be visually inspected for quality of workmanship and conformance to this specification and the drawings. The inspection shall include checks of dimensional conformance, mechanical fit, alignment of parts, and marking.

4.6.2 Weld Inspection. All welds shall be visually inspected for quality in accordance with section 6 of AWS D1.1.

4.6.3 Paint Inspection. The Contractor shall measure the dry film thickness at a minimum of twelve different locations on the outside of the box (two measurements per side) and twelve different locations on the inside of the box (two measurements per side)

4.6.4 Documentation Review. The documentation required by paragraph 3.8 shall be reviewed for conformance with this specification and provided to the COTR upon request.

4.7 Rejection for Defects. The Coast Guard will reject all items which do not conform to the requirements of this specification. Repair or replacement of the rejected items shall be by the Contractor at the Contractor's expense. All rejected items shall be resubmitted for inspection only when they conform to the requirements of this specification. Resubmitted items shall be identified as such, and shall be kept separate from new items. If defective items are found, no further items will be accepted by the Coast Guard until the Contractor has demonstrated that the defects have been corrected and that the cause of the defects has been eliminated from the production process.

5. PACKAGING.

5.1 Packaging requirements are specified in Section D, Part I, Contract Schedule.

6. NOTES

6.1 First Article Inspection. The quantity of first articles required will be listed in Section B, Part I, Contract Schedule. A first article inspection shall be performed by the Contractor and at the Contractor’s facility. The first article shall meet the requirements of this specification and shall pass all the tests and inspections listed in paragraph 4.

SPECIFICATION NO. 460H - FABRICATION OF BUOY SOLAR BATTERY BOXES

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Prepared by

Signature on File

Mr. Dennis Strahl
Buoy & Structures Team

Reviewed by:

Signature on File

Mr. Wayne Danzik
Buoy & Structures Team

Approved:

Signature on File

Mr. Harley Cleveland
Chief, Ocean Engineering Division

Date:

18 October 2005